# A Theory of Credit Cards

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# Credit Cards Are Popular

- Credit cards are the third most popular payment instrument in the United States
- 14.2 billion credit card transactions took place in the United States accounting for $1.10 trillion in 1999
- Despite being the most expensive for merchants to accept

# The Merchant's Cost

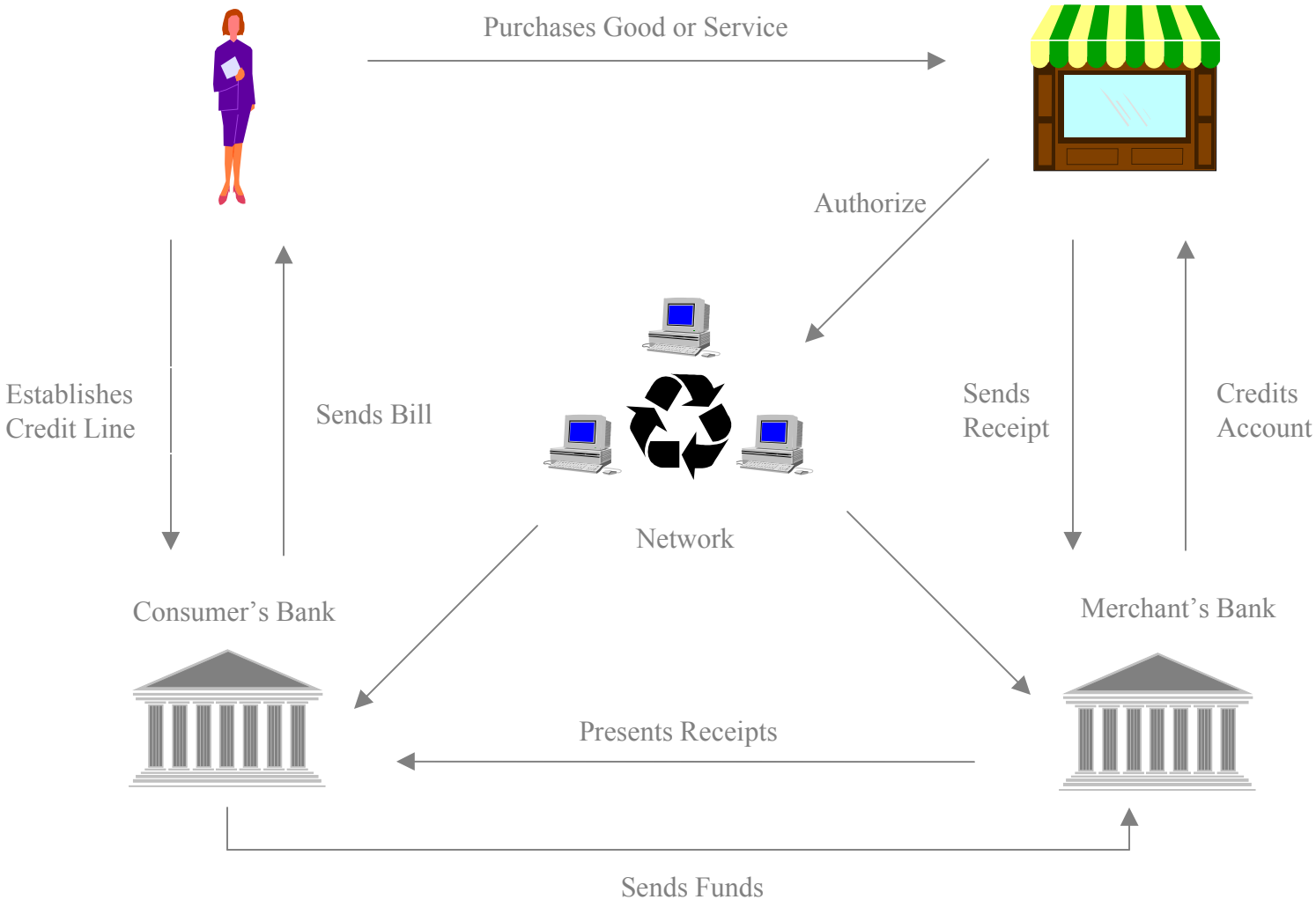
| Cost per $100 of purchases | Cash | Check (verified) | Check (not verified) | On-line debit | Off-line debit | Credit card |
|---|---|---|---|---|---|---|
| 1997 | $.72 | $.82 | $1.07 | $.70 | $2.43 | $2.41 |
| 1999 | $.90 | $.60 | $3.00 | $.80 | $1.80 | $1.80 |

Source: Food Marketing Institute, 1998 and 2000

# Credit Card Benefits to Consumers

- Extension of short- and long-term credit
- A widely-accepted payment instrument
- Offers several other benefits such as fraud protection, dispute resolution services, frequent-use awards, and ability to make remote purchases

# Bilateral Relationships in Credit Card Networks

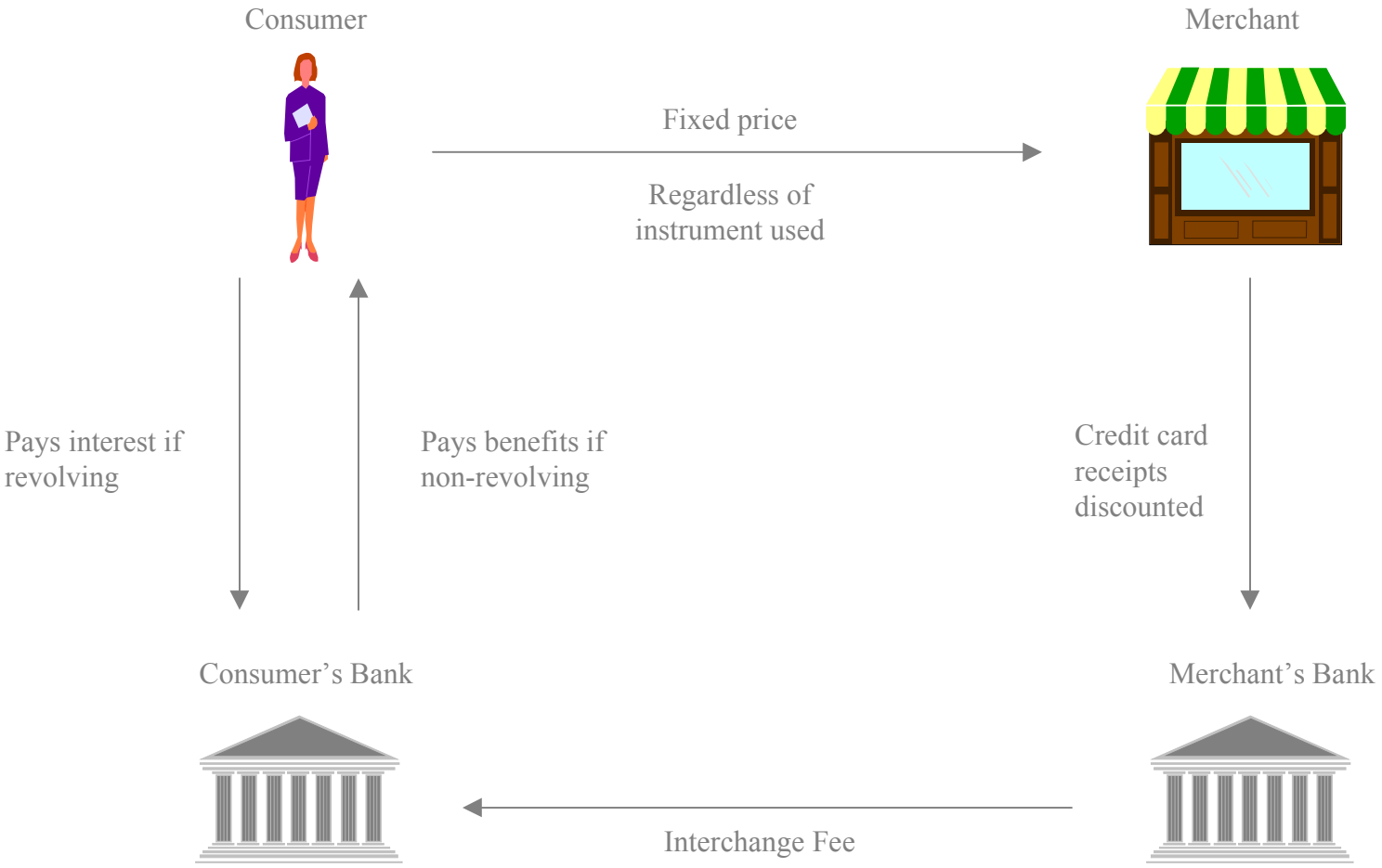


# Two Observations About Credit Cards

- Merchants seldom impose additional fees for credit card purchases

- If consumers do not carry balances, they benefit from credit card use without sharing directly in its costs

# Underlying Costs



# New Approach to Model Credit Card Networks

- Baxter (1983)
- Chakravorti and Emmons (2001)
- Gans and King (2001)
- Katz (2001)
- Rochet and Tirole (2000)
- Schmalensee (2000)
- Schwartz and Vincent (2000)
- Wright (2000 and 2001)

# Two Recent U.S. Antitrust Cases

- Department of Justice vs. MasterCard and Visa

  Governance Duality

  Exclusivity

- Group of Retailers vs. MasterCard and Visa

  Tying of credit cards and offline debit cards

# Credit Card Networks Under Investigation in Other Countries

- Australia (see Reserve Bank of Australia, 2001)
- European Commission
- United Kingdom (see Cruickshank, 2000)

# Trying to Answer the Following Questions

- Why do merchants accept credit cards despite being the most expensive to accept?
- What conditions are necessary for a credit card equilibrium to exist?
- Does the credit card market exhibit network effects?
- Does the decision of a merchant to accept credit cards affect profits of other merchants?

# The Model

- Two-period dynamic model
- Agents—Consumers, Merchants, and a Card Issuer
- Card Issuer also acts as acquirer and network operator

# Consumers

- Continuum of consumers
- With probability $1-\gamma$, consumers need to consume one-unit of a specific good
- Receive income $\omega_t$ in each period $t = 1, 2$
- Discount second period consumption by $\beta$
- Earn $R$ where $R > 1$ for any funds not spent in period $1$
- Can receive credit card if $\omega_1 > \hat{\omega}$, where $\hat{\omega}$ is the minimum income requirement set by the card-issuer

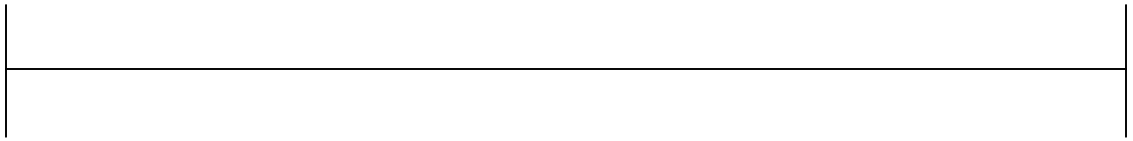
# Merchants

- Continuum of monopolist merchants each selling a different good
- Merchant sells good at $p$
- Merchants earn non-zero profits because $p > c$
- Merchant pays merchant discount, $\rho$, to card-issuer for all credit card sales
- No one merchant can influence its second period sales

# Monopolist Card Issuer

- Sets the income requirement, $\hat{\omega}$, for consumers and merchant discount, $\rho$, to maximize profits
- Extends credit in period *1* to consumers where $\omega_1 > \hat{\omega}$
- Borrows at $R$ to pay merchants in period *1*
- Charges no interest to consumers for credit card purchases
- Collects debt prior to period *2* consumption

# Timeline



**1**

- Issuer sets income limit, $\hat{\omega}$, and merchant discount, $\rho$
- Merchants choose whether to accept credit cards
- $\omega_1$ is realized and $1-\gamma$ consumers are identified
- Issuer pays merchants for card purchases

**2**

- $\omega_2$ is realized
- Credit-issuer collects payment
- $1-\gamma$ consumers consume in period 2 if they have sufficient funds

# Equilibrium

**Consumers**

- Always prefer to purchase good if need to in period 1
- Always prefer to use credit cards even if liquid

# Equilibrium

**Merchants**

- Will only accept credit cards if $\hat{\omega} < p$
- Will accept credit cards if $\pi^c \geq \pi^{nc}$ in first period
- However, by accepting credit cards overall profit is lower than if they did not accept credit cards (Negative externality)
- Depends on 3 factors:

  The degree of concentration in the market for card issuers

  The amount of bargaining power by merchants

  The impact of a single merchant's decision on repeat sales

# Equilibrium

**The Card-Issuer**

- If R is sufficiently close to *1* and $p - c$ is sufficiently large, there exists a $\hat{\omega} \in [\underline{\omega}, p)$
- Extracts almost all additional revenue from sales to illiquid consumers
- The ability to charge a higher merchant discount is related to the number of additional consumers able to make purchases (network effect)

# Extensions

- Allow merchants to set prices to recover credit card costs
- Allow merchants to set prices based on instrument used
- Add an additional period where consumers borrow at $R^{CC} > R$
- Allow more than *1* card-issuer
- Consider competing credit card and alternative payment networks such as debit cards